Management of concurrent thoracic and abdominal aortic aneurysms

Saw Siong Teng, MRCS[1], Feona S. Jospeh, MS[2], Benjamin Leong Dak Keung, FRCS[1]

[1]Vascular Unit, General Surgery Department, Hospital Queen Elizabeth, Kota Kinabalu, Sabah, [2]Vascular Unit, General Surgery Department, Hospital Kuala Lumpur

SUMMARY

Concurrent thoracic and abdominal aortic aneurysm is uncommon. It remains a formidable surgical challenge to vascular surgeons, as decision to treat in staged or simultaneous setting still debatable. We present, here, a case of a 62-year-old-man with asymptomatic concurrent thoracic and abdominal aortic aneurysms, which was successfully treated with two-stage hybrid endovascular repair. The aim of this case report is to discuss the treatment options available, possible associated complications and measures to prevent them.

KEY WORDS:

Concurrent; thoracic aortic aneurysm (TAA); abdominal aortic aneurysm (AAA); hybrid endovascular repair; cerebrospinal fluid (CSF) drainage

INTRODUCTION

Coexisting multi-level aortic aneurysm is uncommon, with the most frequently encountered combination being infra-renal abdominal aortic aneurysm (AAA) and descending thoracic aortic aneurysm (TAA). With the advancement of the surgical techniques, both thoracic endovascular aortic repair (TEVAR) and endovascular aneurysm repair (EVAR) appear as an important treatment option for patients with concurrent TAA and AAA. It confers a lower complication risk as compared to open surgical repair which involves open thoracotomy and aortic cross-clamping.

We present, here, a case of concurrent thoracic and abdominal aortic aneurysms, which was successfully treated with two-stage hybrid endovascular repair.

CASE REPORT

A 62-year-old man, who was a chronic smoker with hypertension, was noted to have widened mediastinum in Chest X-ray examination during his medical check-up. Computed tomography angiography (CTA) reviewed concurrent TAA and AAA, with TAA originated just distal to the left subclavian artery (LSA) and infra-renal AAA without common iliac arteries involvement. Both aneurysms measured at 6cm in the largest diameter. He was asymptomatic for the aneurysms.

Two-stage hybrid endovascular procedures were performed for this patient. The first operation began with open aortic arch debranching with left carotico-subclavian bypass by using 6mm PTFE graft. Subsequently, embolisation of proximal LSA was performed with Amplatzer vascular plug (St Jude's) via 6F Fortress Sheath (Biotronic) through left brachial percutaneous approach. Finally, TEVAR was performed in the same setting via bilateral femoral arteries percutaneously with Proglide closure devices (Abbott). Pre-operatively, lumbar drain was inserted for him as prophylaxis for spinal cord ischemia. Two pieces of thoracic covered stents, Valiant Captivia (Medtronic) were deployed covering the origin of LSA. Completion aortogram confirmed that the endovascular graft landed satisfactorily with thoracic aneurysm completely excluded. Post-operatively, he was monitored in intensive care unit (ICU) with maintenance of mean arterial pressure (MAP) more than 90 mmHg and spinal pressure kept at 10 mmHg with cerebro-spinal fluid drainage. The drain was clamped at post-operative day one and removed on the following day with patient also successfully extubated on the same day. The patient was subsequently discharged home well without paraplegia and other post-operative complications.

The second operation was Endovascular Aneurysm Repair (EVAR) for infra-renal abdominal aorta aneurysm, performed two months later. Similar percutaneous bilateral femoral accesses were used. Endurant (Medtronic) stent grafts were used. Completion aortogram showed endovascular graft landed well with no endoleak. Lumbar drain was inserted in pre-operatively as well with similar protocol of MAP more than 90 mmHg and spinal pressure at 10 mmHg. Postoperatively he made a good recovery without renal failure, spinal cord ischemia or other complications, and was discharged home uneventfully.

Patient was seen in clinic three months and nine months after the procedure with CT Angiogram showed no evidence of endoleak. He was scheduled for surveillance CT Angiogram annually.

DISCUSSION

The estimated incidence of AAA is 10-29% among patients with TAA, yet the association between AAA and TAA was still poorly characterized.[1] The mortality of concomitant aortic aneurysms remains high if left untreated. Treatment is advocated primarily to prevent the rupture, but the potential for spinal cord ischemia and other complications, as a result of treatment exist and may discourage surgeons from

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Corresponding Author: Saw Siong Teng
Email: teng1saw@yahoo.com

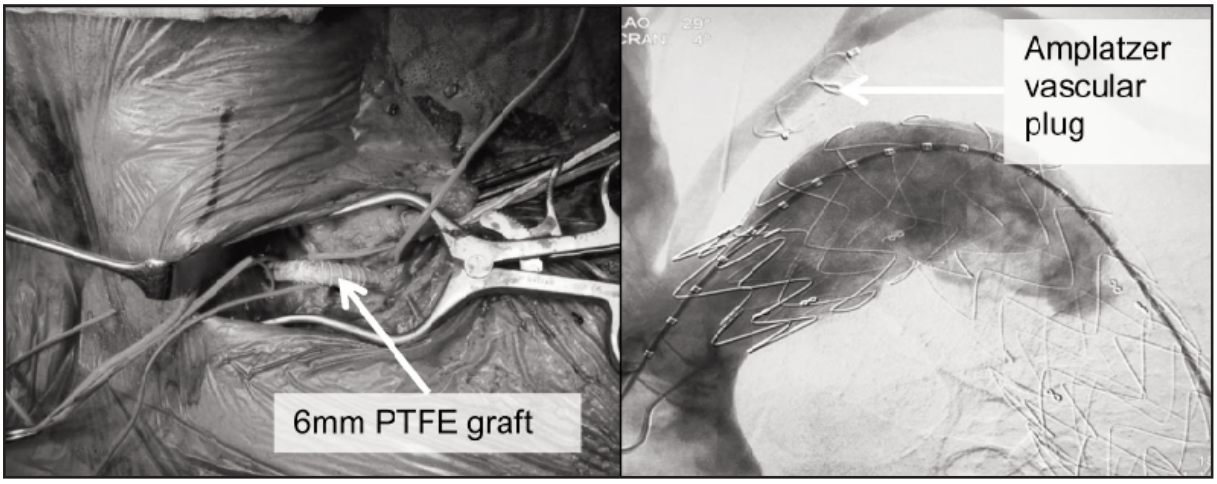

Fig. 1: Photo on the left shows aortic debranching procedure with left carotico-subclavian bypass by using 6mm PTFE graft. Aortogram on the right shows left subclavian artery embolized with Amplatzer vascular plug with thoracic stent graft deployed.

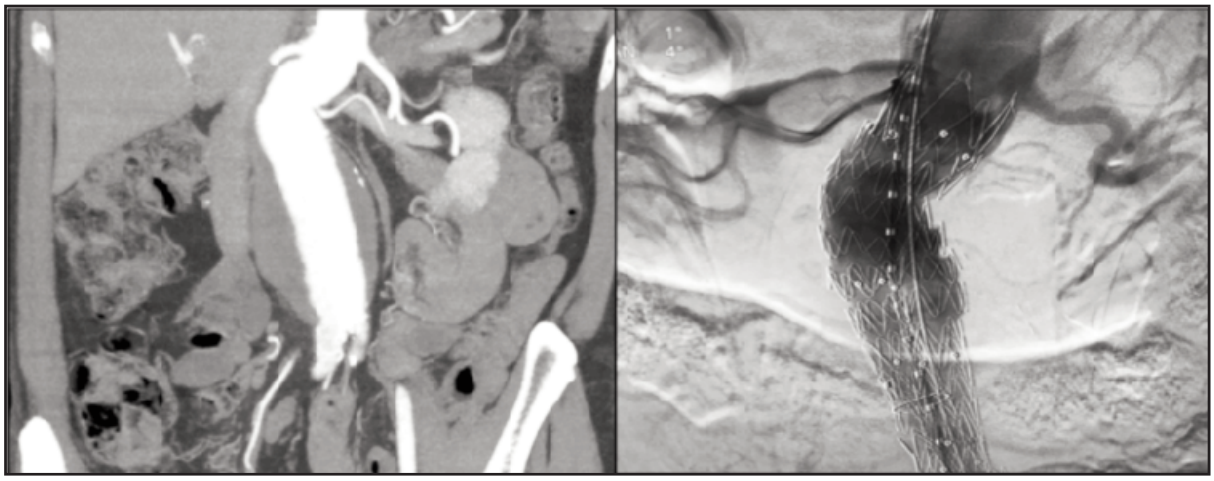

Fig. 2: Pre-operative CT Angiogram on the left shows infra-renal abdominal aortic aneurysm with 6cm in the largest diameter. Aortogram on the right shows post endovascular stenting of infra-renal abdominal aortic aneurysm with no endoleak.

pursuing anatomic correction by any intervention. With the development of endovascular stent graft, multilevel aortic aneurysm disease has been treated with combination of hybrid open and endovascular approaches. Recently, endovascular repair to multilevel aortic segments both in staged or simultaneous setting has been reported; and showed reducing morbidity and mortality in comparison with conventional open surgery. Nevertheless, several authors have asserted the effectiveness of simultaneous endovascular repair without a greater risk of serious complication.[2,3] However; simultaneous endovascular repair increases the injected contrast load that is nephrotoxic, potentially causing contrast-induced nephrotoxicity. Extensive segmental aortic coverage during simultaneous repair may interrupt collateral perfusion especially intercostal, pelvic and hypogastric arteries, increasing the risk of spinal cord ischemia as well.

Two-stage hybrid endovascular repair was favoured for our patient after considering the potential contrast-induced nephropathy and risk of spinal cord ischemic injury. In this case, endovascular repair of descending thoracic aneurysm would result in intentional covering the ostia of left subclavian artery for proper proximal landing zone. The development of aortic debranching technique with subsequent TEVAR provides a new option on the treatment for thoracic aortic aneurysm that arises very near to the left subclavian artery. Left carotico-subclavian bypass not only allow proper placement of thoracic stent graft, but also preserves left vertebral perfusion which helps to reduce spinal cord ischemic injury.

The rationale for cerebrospinal fluid (CSF) drainage is based on evidence that suggests that decreasing CSF pressure to less than 10mmHg during clamping to the thoracic aorta enhances perfusion of spinal cord and decreases the risk of ischemic injury.[4] Spinal cord injury was reported in 8% of

patient with treated multilevel aortic disease. Recent studies provide encouraging evidence to support the use of CSF drainage as an adjunct to decrease paraplegia and lower limb neurological deficits.[5] With the lumbar drain inserted in both operations, our patient recovered without spinal cord ischemia.

CONCLUSION

Hybrid endovascular procedure is a good option in treating challenging concurrent thoracic and abdominal aortic aneurysms. Potential risk of spinal cord ischemia and contrast-induced nephropathy should be taken into account in deciding the best option in treating patients with such pathology.

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